1 Large animals, such as mammals, need efficient transport systems.

(a) Fig. 3.1 shows a section through the mammalian heart.

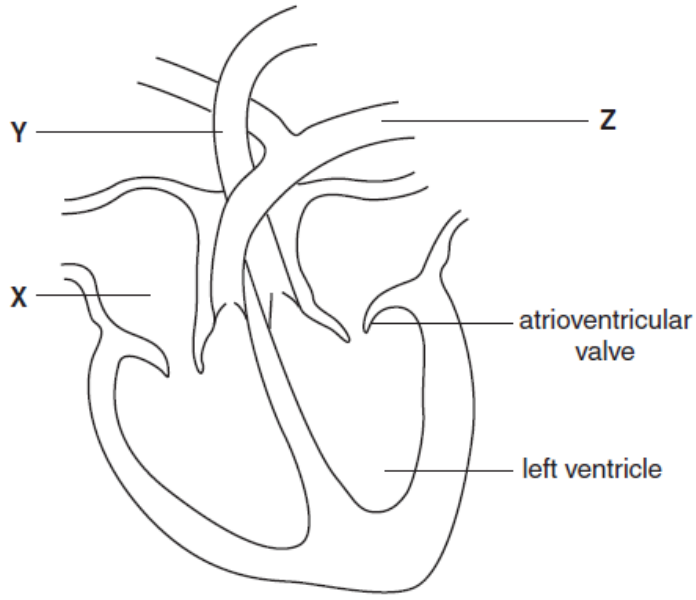

Fig. 3.1

(i) Name the parts labelled **X**, **Y** and **Z**.

X .....

Y .....

Z ..... **[3]**

(ii) Explain why the wall of the left ventricle is thicker than the wall of the left atrium.

.....

.....

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..... **[3]**

(iii) Explain how pressure changes in the heart bring about the closure of the atrioventricular (bicuspid) valve.

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.....

.....

..... [2]

(b) The mammalian transport system is a double circulatory system.

An efficient circulatory system consists of a pump, a means of maintaining pressure, a transport medium and exchange surfaces.

State the component of the **mammalian circulatory system** that fulfils each of these roles.

The first one has been done for you.

pump	heart
means of maintaining pressure	.....
transport medium	.....
exchange surface	.....

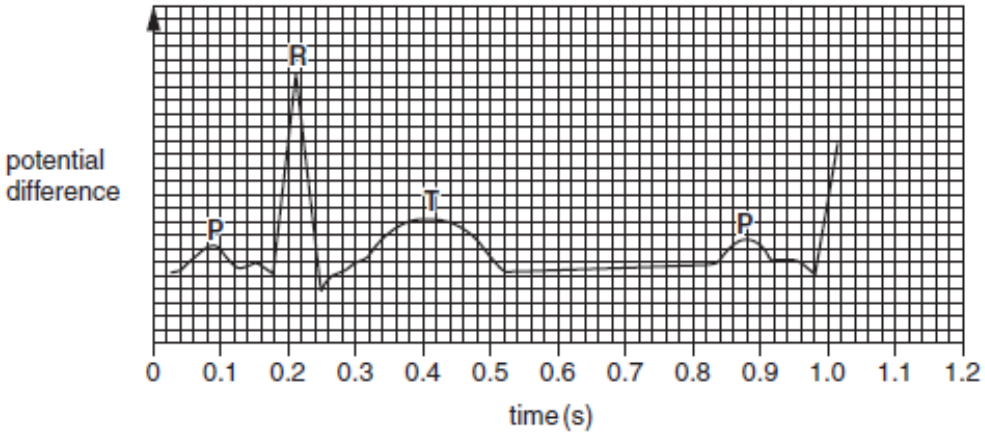
[3]

[Total: 11]

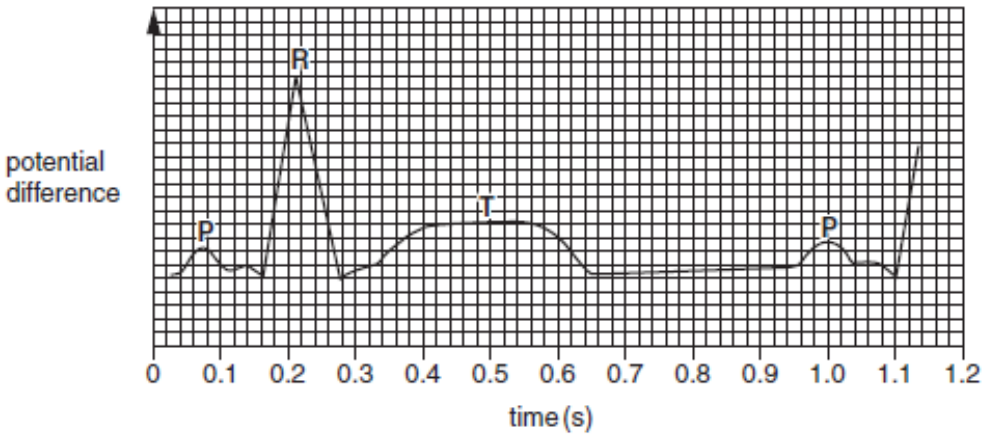
2 Fig. 6.1 shows two electrocardiogram (ECG) traces.

- Trace **A** is a normal trace.
- Trace **B** is a trace from a heart after treatment with the drug digitalis.

Trace **A** – an electrocardiogram from a normal heart



Trace **B** – an electrocardiogram from a heart after treatment with digitalis



(a) Calculate the heart rate using the information in Trace **A**.

Show your working.

Answer = ... beats per minute **[2]**

(b) Using the information in Fig. 6.1, state **two** effects of digitalis on the activity of the heart.

1 .....

.....

2 .....

..... **[2]**

(c) Describe the roles of the sinoatrial node (SAN) **and** the atrioventricular node (AVN) in coordinating the cardiac cycle.

.....

.....

.....

.....

.....

.....

..... **[3]**

[Total: 7]

3 **(a)** **(i)** Name the type of muscle found in the walls of the heart chambers.

.....[1]

(ii) Name the process that creates pressure inside the heart chambers.

.....[1]

(b) Fig. 6.1 shows the changes in pressure inside the heart chambers during one heart beat.

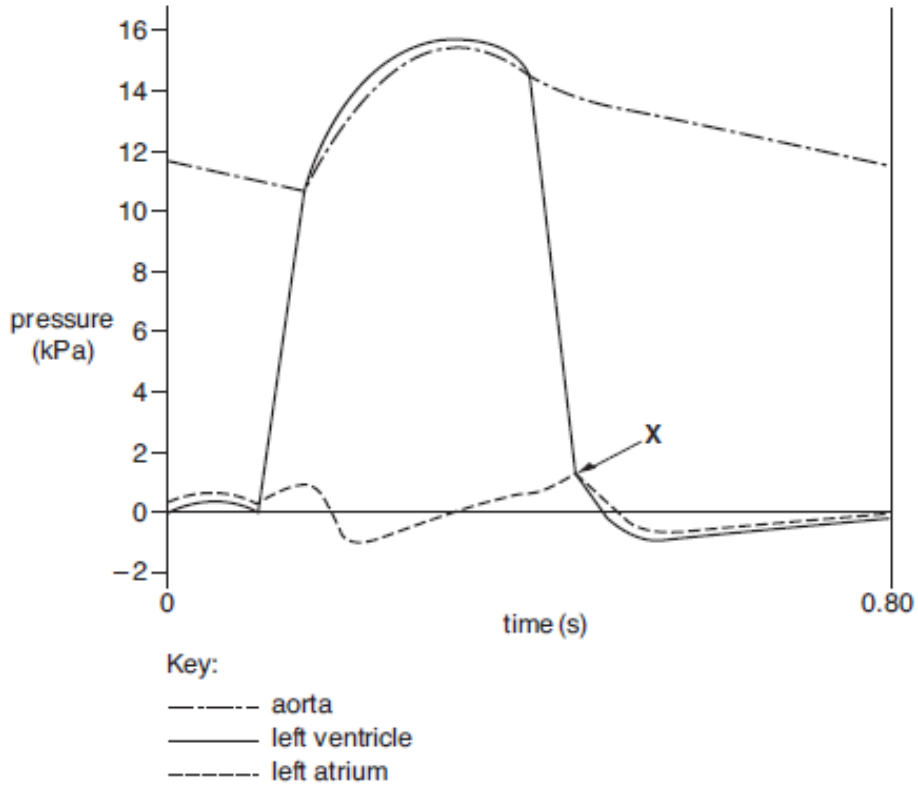


Fig. 6.1

(i) Calculate the heart rate from the information in Fig. 6.1.

Show your working and give your answer **to the nearest whole number**.

Answer = ... beats min^{-1} **[2]**

(ii) Describe and explain what happens **immediately after X** on Fig. 6.1.

In your answer, you should use appropriate technical terms, spelt correctly.

.....

.....

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.....

.....

.....

.....

..... **[4]**

[Total: 8]

4 Fish have a single, closed circulatory system.

(a) State the meaning of the terms *single circulatory system* and *closed circulatory system.*

single circulatory system .....

.....

.....

closed circulatory system .....

.....

..... **[2]**

(b) The heart of a mammal contains four main chambers. The action of these chambers is coordinated by electrical activity in specialised tissues.

Fig. 5.1 shows where these tissues are found in the heart.

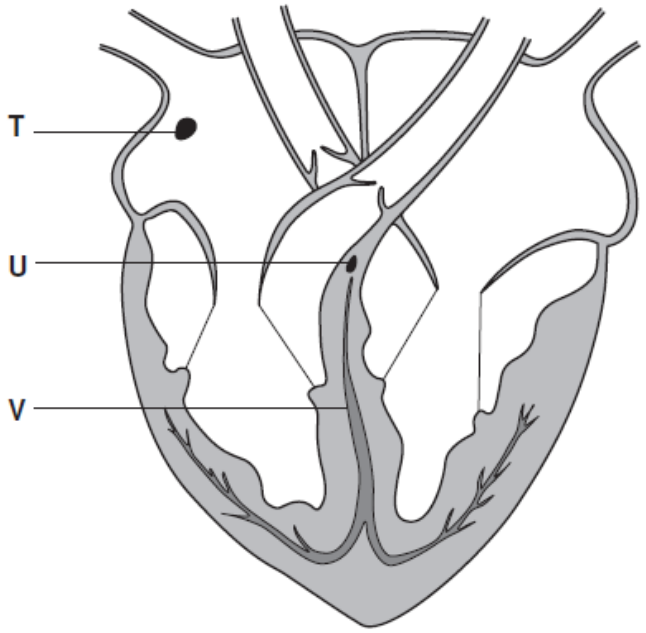

Fig. 5.1

(i) Name the tissues labelled **T**, **U** and **V**.

T .....

U .....

V ..... **[3]**

(ii) Describe how the action of the heart is initiated **and** coordinated.

In your answer, you should use appropriate technical terms, spelt correctly.

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.....

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..... **[5]**

[Total: 10]

5 Read the following passage and complete each sentence by writing the most appropriate **term or phrase** in the spaces provided.

Large, active organisms need a circulatory system because they have a small

..... .

Haemoglobin is a pigment found in red blood cells. These cells are also known as

..... . Haemoglobin has a high ..... for oxygen. In the

lungs, the haemoglobin associates with oxygen to form ..... .

In respiring tissues, the oxygen is released by dissociation. In very active tissues, the amount of

oxygen released can be increased by the presence of more ..... .

This is called the ..... effect. **[6]**

[Total: 6]

6

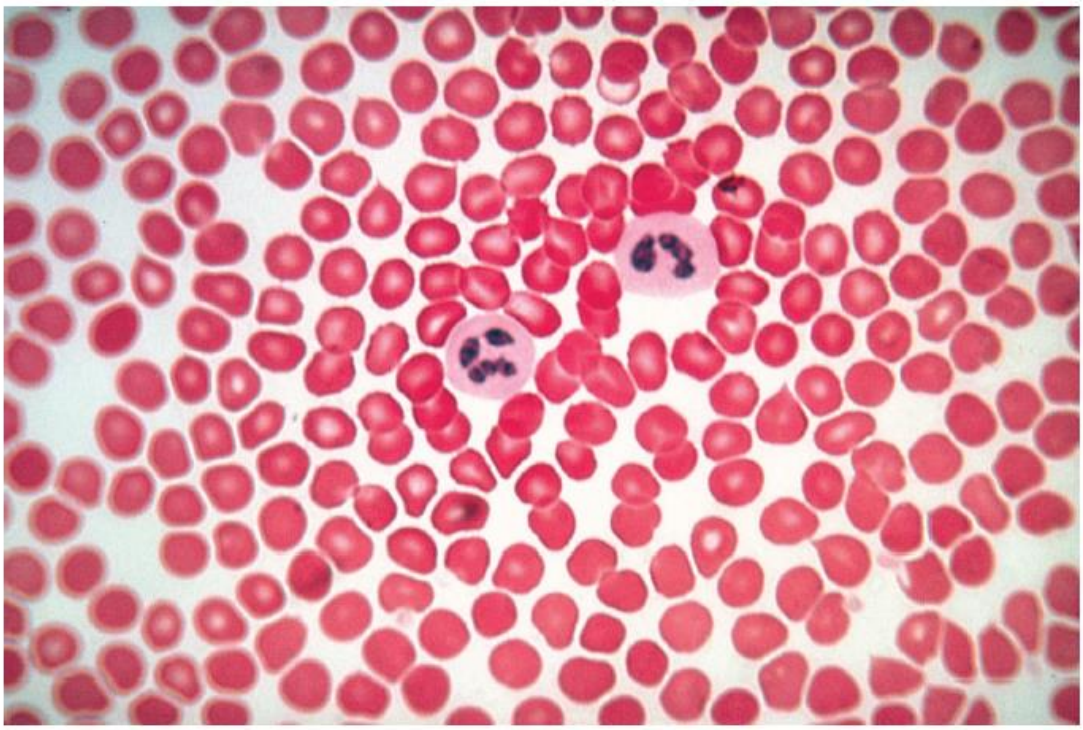

Fig. 2.1

Fig. 2.1, **on the insert**, is a photomicrograph of a blood smear. The smear has been stained.

(a) State **two** reasons why the blood smear has been stained.

.....

.....

.....

.....

.....

..... **[2]**

(b) Suggest **one** detail that would be made visible if the micrograph were taken using:

(i) a scanning electron microscope

.....

(ii) a transmission electron microscope.

..... **[2]**

(c) The red colouration of the red blood cells is caused by the pigment haemoglobin. The main function of haemoglobin is to transport oxygen in the form of oxyhaemoglobin.

Fig. 2.2 shows the dissociation curves of adult oxyhaemoglobin (curve **A**) and fetal oxyhaemoglobin (curve **F**).

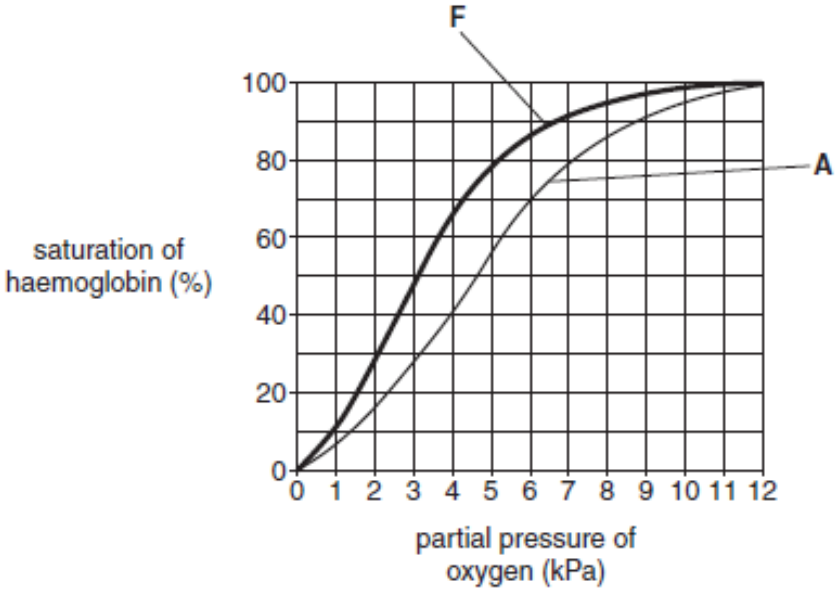

Fig. 2.2

Explain why the curve for fetal oxyhaemoglobin is to the left of the curve for adult oxyhaemoglobin.

In your answer you should use appropriate technical terms, spelt correctly.

.....

.....

.....

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.....

.....

.....

.....

..... **[4]**

(d) In high partial pressures of carbon dioxide, the oxyhaemoglobin dissociation curve undergoes a change known as the Bohr shift.

(i) **Draw a curve on Fig. 2.2** to show the effect of the Bohr shift. **[2]**

(ii) Outline the benefits of the Bohr shift to actively respiring tissue.

.....

.....

.....

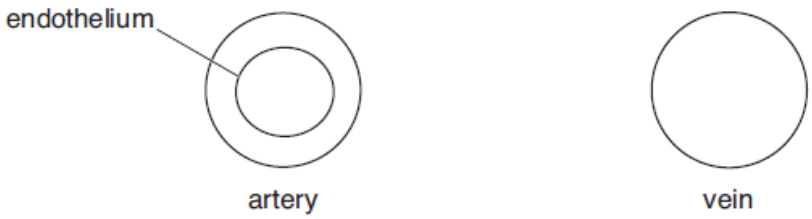
.....

..... **[2]**

[Total: 12]

7 **(a)** **(i)** Fig. 5.1 represents a transverse section of an artery and a vein.

Draw a line to show the relative position of the endothelium of the **vein**.



[1]

Fig. 5.1

(ii) State **two other** ways in which the wall of an artery is different from the wall of a vein.

1 .....

.....

2 .....

..... **[2]**

(b) **(i)** Blood in the arteries has a high hydrostatic pressure.

State how this hydrostatic pressure is generated in the heart.

.....

..... **[1]**

(ii) Explain why the hydrostatic pressure of the blood drops as blood moves away from the heart.

.....

.....

.....

..... **[2]**

(iii) Capillaries have walls that are one cell thick.

Fig. 5.2 shows how the hydrostatic pressure of the blood changes as it moves through a capillary.

Fig. 5.2 also shows the water potential of the blood, due largely to the plasma proteins, which tends to move water into the blood.

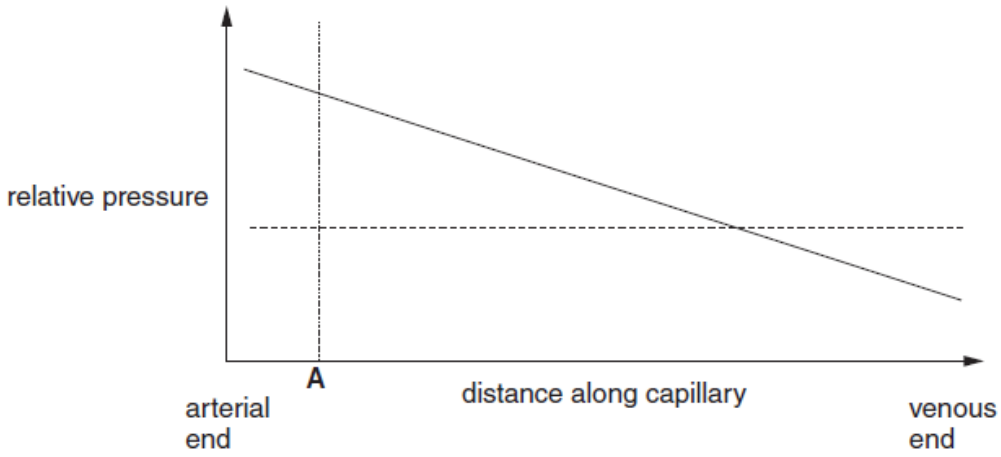


Fig. 5.2

Describe **and** explain what happens to the blood plasma at point **A** along the capillary in Fig. 5.2.

.....

.....

.....

.....

.....

.....

.....

..... **[3]**

(c) Carbon dioxide is produced in tissues as a waste product of respiration.

The majority of carbon dioxide is carried as hydrogencarbonate ions (HCO_3^-) in the plasma.

Fig. 5.3 shows the chemical pathway in which carbon dioxide is converted into HCO_3^- in a red blood cell.

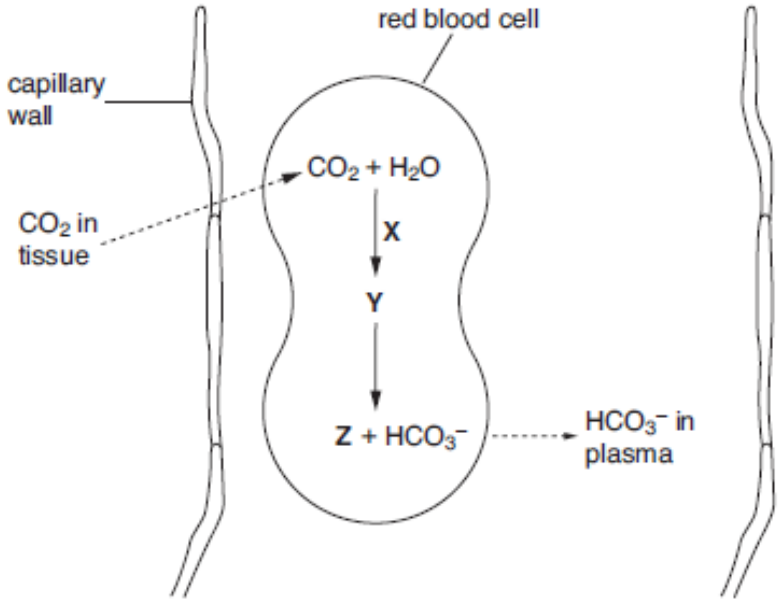


Fig. 5.3

Identify the following:

enzyme **X** .....

substance **Y** .....

ion **Z** ..... **[3]**

[Total: 12]